HENRYS LAKE HATCHERY

Annual Report

October 1, 1984 to September 30, 1985

by

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ABSTRACT

The adult spawning run in Hatchery Creek consisted of approximately 25,000 cutthroat, of which 5,977 fish were spawned for a total production of 4.8 million eyed cutthroat eggs. In addition, 353,000 normal eyed hybrid (cutthroat x rainbow) eggs from four strains of rainbow trout were produced, and the sterile hybrid program yielded 80,000 eyed eggs. Eyed cutthroat eggs (3.5 million) were shipped to Ashton, Mackay, and McCall hatcheries; and hybrid eggs were shipped to Grace. This fall 1.0 million cutthroat fingerlings, 310,000 hybrid fingerlings, and 111,000 Canadian brook trout fingerlings were released in Henrys Lake.

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INTRODUCTION

Henrys Lake Hatchery is located on Highway 87 about 50 miles from Ashton in the Island Park area. Hatchery buildings include a spawnhouse, office, garage complex, and one permanent residence with a summer cabin. The Hatchery Superintendent resides at the hatchery year-round, and the cabin provides temporary housing for technical and other personnel as needed.

The hatchery water supply, at a constant 44°F, originates from a nearby spring (Hatchery Creek) and is gravity fed to all buildings and an outdoor rearing pond. A concrete fish ladder extends from the spawnhouse to the lake and provides spawner access as well as a secure route for fry escapement. The hatchery has water rights on one cfs which supplies the residential and fish rearing facilities.

Egg hatching facilities include 20 Heath incubator stacks (8 trays/ stack) with 10 inlet pipes delivering 6 gal./min./stack. Fry rearing space consists of three indoor concrete starter vats with a maximum volume of 2,000 gallons. Feeding fry are transferred from the vats to the outdoor pond (150,000 gal.), where they are reared to as large as possible and released directly to Hatchery Creek in late September. Growth in the pond exceeds that in the vats due to the warmer temperatures in the pond (45-50°F). The Hatchery Creek stocking rate is maintained at about 500,000 fish to ensure an adequate return of adults for future egg taking purposes, and the seasonal composition of the release is taken into consideration so that all phases of the parent adult run are represented. Fingerlings reared over the summer at other hatcheries are returned to Henrys Lake in late September and distributed at several primary tributaries in the numbers necessary to meet the overall stocking goal.

The purpose of Henrys Lake Hatchery was historically to supplement the lake's native cutthroat population in the face of ever increasing exploitation of the fishery. In recent years, the hatchery has also been instrumental in establishing and enhancing a highly popular cutthroat x rainbow hybrid fishery. Emphasis has been on developing a sterile hybrid which will continue to provide quality sport fishing without the threat of interbreeding with the native cutthroat population. The hatchery is also the focus of efforts to establish and maintain the Canadian brook trout fishery, and a fall spawning run of this species should be established in Hatchery Creek in the near future.

OBJECTIVES

The objectives of Henrys Lake Hatchery are to:

1. Obtain sufficient Henrys Lake cutthroat eggs to provide for a return of one million fingerlings to the lake each fall. The total production goal equals approximately five million eyed eggs with, most of the excess being shipped to other state hatcheries for hatching, rearing, and statewide distribution.

2. Rear on-site 400,000 cutthroat fingerlings for release in Henrys Lake, and to stock Hatchery Creek to maintain the spawning run.

3. Take sufficient cutthroat eggs for crossing with rainbow sperm to produce 200,000 hybrid fingerlings for release in Henrys Lake and to develop methods for sterilizing these hybrids.

4. Establish and maintain a spawning run of Canadian brook trout (Temiscamie strain) in Hatchery Creek sufficient for the production of 150,000 eggs and subsequent release of 100,000 fingerlings each fall.

FISH PRODUCTION

Egg Production

The spawning season extended from March 11 to June 3, with a total of 5,860,353 green eggs taken from 3,146 females at a ratio of 1.1 females:1.0 males (Table 1). Eggs from five females were pooled and fertilized with pooled sperm from three to seven males, depending on run composition. Ten percent of fish were measured for total length.

Eye-up of cutthroat eggs was 86X, with similar success for normal hybrids (90X). Average eye-up of eggs hatched at Henrys Lake Hatchery was 80% (1,237,632/1,546,384), including several lots of eggs taken from overripe females (50-75% eye-up). The average number of eggs per female was 1,862, about 200 fewer than in previous years. Eggs eyed-up at 300 temperature units (TU) and hatched at 516 TUs.

A total of 288 RC hybrids (58 females, 230 males) were counted and measured in this year's run. Rainbow sperm was obtained from Ennis broodstock (Ennis NFH, Ennis, Montana), taken dry, pooled, and transported to Henrys Lake where mobility was assessed. Eggs from five female cutthroat were then pooled and fertilized with the sperm. The results of the hybrid crosses indicated that Kamloops and McConaughy as well as Eagle (Creston NFH, Kalispell, Montana) strains provided the best results (80% survival to stocking), while redband performed the worst (20X). Although many possible factors may determine hybrid viability, one which appears to be relevant at present is timing with respect to fertility and condition of the parent fish. Since the health and fertility of March female cutthroat is not in question, the problem now focuses on determining the period of best advantage with respect to the male stock.

Heat-shock-induced triploidy was quantitatively improved as shown by comparing numbers of eggs processed this year with past records (Appendix A). The recirculation method increased the number of eggs which can be processed at one time. In addition, survival to stocking increased 10% to 15X. However, survival of heat-treated eggs still remains well below that of normal hybrid eggs (Appendix B). Although it may be possible to further improve egg survival with the heat-shock technique, it seems unlikely that survival to stocking can be extended much beyond 50% using current techniques.

Table 1. Spawning summary, 1985.

Species	Strain	Green eggs	Eyed eggs	% Eye-up
CT	C-3	5,613,569	4,814,452	85.8
RC	Kamloops	204,589	191,959	93.8
	sterile	60,798	38,878	60.9
	McConaughy	51,937	44,797	86.3
	sterile	53,040	38,760	73.1
	Redband	54,311	42,326	77.9
	sterile	60,000	2,000	3.3
	Eagle	79,697	74,084	93.0
Total RC		390,534	353,166	90.4
sterile		173,838	79,638	45.8

Fry size at first feeding was estimated at 0.75 in., based on 510 eggs/oz. Growth rates (G) of fry reared in indoor vats ranged from a low of .006 in./day to a high of .015 in./day (Appendix C). Growth rates of fry in the outdoor pond varied from .011 in./day to .015 in./day and average size at release to the lake was 2.2 in. Vat temperatures are constant at 44°F, but pond temperatures rise gradually to about 50°F during the summer. Growth rates are generally higher in the pond for reasons explained below. Temperature units per inch of growth was about 50 in vats and pond. This year it took 400 pounds of feed to produce 915 pounds of fish at a cost (excluding capital outlay) of $29/lb.

Optimal growth was achieved at density index (D) = .5 to 1.0 and flow index (F) = 2 to 3. Although these values are higher than general trout guidelines, (Piper and Smith), it is possible that Henrys Lake cutthroat trout require slightly different conditions for optimal growth. Generally, better growth rates in the pond confirm the need to transfer feeding fry to the outdoor facilities as soon as possible where growth may be enhanced by higher temperatures as well as dietary supplementation with pond organisms.

Feed was administered at the recommended rate of 3% to 4.5% of body weight per day in the vats. Using a hatchery constant of 4.5% body weight per day for one-inch fry is 4.5 (vats) and for two-inch fry is 2.25 (pond). Actual feeding rates were adjusted after observations revealed that the calculated rates were excessively high, especially in the pond. As a general guideline, fish in the vats were fed at 3% body weight per day, and those in the pond were fed at 1.5% body weight per day.

Fish in the vats were fed exclusively Rangen's (semi-moist) and ponded fish were maintained on the dry diet. Mortality in the vats was generally higher (3,000 to 8,500/mo.) compared to the pond (1,500/mo.). However, when pond fish were enumerated in September, it was discovered that only 70% of the expected number, based on mortality counts, was actually in the pond. At this time, the cause or causes of this discrepancy can only be speculated:

1. Mortality in the pond was greater than observed;

2. Fish loss via escape downstream (primarily from a leaky headgate); and

3. Significant predation.

The stocking program in Hatchery Creek and future numbers of returning adults in the spawning run are dependent on an accurate assessment of fry stocked here, so it is essential to identify and eliminate the source of this apparent loss.

Egg Shipments and Fall Stocking Program

A total of 3.5 million eyed cutthroat eggs were shipped to Ashton, Mackay, and McCall hatcheries; and 430,000 eyed hybrid eggs were shipped to Grace (Table 2).

This year, Hatchery Creek was stocked with fry from all phases of the spring run in order to maintain a balanced composition of returning adults, as shown below:

Spawning interval	No. stocked	Proportion (%)	Size (no./lb.)
Early (March)	92,180	19	88
Mid (April)	152,500	32	268
		(15,800 adipose clipped)	
Late (May)	156,000	33	312
Mixed (March & May)	78,000	16	130
		(78,000 adipose clipped)	
Total	478,680	100	
		(93,800 adipose clipped)	

An additional 524,350 fry and fingerlings (96-155/lb.) were stocked in four other tributaries (215,800/Targhee; 110,050/Timber; 102,400/ Howard; 96,100/Duck), bringing the total cutthroat release to 1.0 million (Table 3). At Henrys Lake and Mackay, approximately 10% (106,800) of stocked fish were adipose clipped (Ad), and all sterile hybrids were ad-clipped at Ashton.

All normal hybrids were released at Howard Creek (State Dock), and sterile hybrids were released at the hatchery ladder, for a total hybrid release of 310,383. Ad-clipped Canadian brook trout were also released at the ladder. Fish stocked in Hatchery Creek were held in the ladder temporarily (3-5 days) to facilitate gradual acclimation to stream conditions and allow adequate time for imprinting to their future adult destination. The presence of predatory birds in the fall limits the acclimation period.

Additional regional fish distribution was performed by hatchery personnel as follows:

Destination	Number	Size (no./lb.)	Total
Snake River (Henry Fork)	168,187	1,543	
	804,630	3,500	972,817
Mountain	6,000	2,000	6,000
Targhee Cr. (above culvert)	3,200	1	3,200

Table 2. Eyed egg shipments, 1985.

Species	Strain	To: Grace	Ashton	McCall	Mackay
CT	C-3	--	825,290	625,187	2,097,304
RC	Kamloops	191,959			
	sterile	38,878			
	McConaughy	44,797			
	sterile	38,760			
	Redband	42,326			
	sterile	-0-			
	Eagle	74,084			
Total CT			3,576,820		
Total RC		430,804			

Table 3. Henrys Lake fall stocking program, 1985.

Species	Strain	Source	Number of fish	Size (no./lb.)	Total
CT	C-3	Mackay	850,530	88-312	
		Henrys Lake	152,500	268	1,003,030
RC	Kamloops	Grace	160,765	136-182	
	sterile		13,029	105	
	McConaughy		39,093	166	
	sterile		19,521	105	
	Redband		11,250	300	
	sterile		-0-		
	Eagle		66,725	157	277,833
					32,550
BK	Canadian	Ashton	111,020	74 - 84	111,020

Although 38,000 eggs were taken from adult (2+) Canadian brook trout ascending the ladder in November 1984, no adult brook trout appeared in 1985 (710 "fall spawning" cutthroat were counted in the ladder in November 1985). Due to a general population decline in the lake, it does not appear possible to establish a meaningful spawning run of this species until 1986, when two-year-olds from 1984 should appear.

Egg fungal infections were controlled by drip treatment with 1,750 ppm formalin. High pre-eye mortality (25-502) was encountered in four lots of eggs and was attributed to sporadic female overripeness. Soft-shell disease was apparent in late-May and early-June egg takes, but was not extensive. All eggs were water-hardened in 1:150 Argentyne followed by a ten minute treatment with Wescodyne (4 oz./stack). A biopsy to determine Argentyne toxicity revealed no significant differences in survival to eye-up in 1:50, 1:100, 1:150, and 1:200 solutions, although survival of all treated groups was 152 below that of untreated eggs.

Adult spawners were generally in excellent condition throughout the run, but gravid females were particularly susceptible to handling stress and anesthetic (Quinaldine) in late-May as were fish held in the spawnhouse to ripen.

Laboratory analysis (Harold Ramsey) of gonads and internal organs of ripe spawners failed to detect any pathogens (virus, BKD, PKD and systemic bacteria). Fish Health Inspection Reports (USFWS) requested for male rainbow broodstock used in hybrid studies indicated that all strains were disease-free.

HATCHERY IMPROVEMENTS

This year the utility poles to the spawnhouse were replaced, all electrical outlets were grounded, and the flagpole was remounted.

MISCELLANEOUS

The Hatchery Superintendent assisted research and enforcement personnel when needed and informed the public, through newspaper articles and guided tours, about the hatchery and Henrys Lake. An increasing amount of time was devoted to supervising the technical program and coordination with management personnel. Enhancement activities included screen maintenance, creel census, fry trapping, fish scale collecting and trap netting, as well as assistance provided for salvage operations.

STAFF

Lynn Watson, Hatchery Superintendent I; Scott Grunder, Fish and Wildlife Technician.

Appendix A. Henrys Lake sterile hybrid program summary, 1981-1985.

Year	Technique	No. eggs treated	% Triploidy	% Eye	% Hatch	% Stocked
1981	dip	1,270	100	90	--	32
1982	dip (10 lots)	223,000 (20,000 x 10)	11	53	--	37
1983	dip	22,464	66		--	
	dip	11,232	0	59		
1984	dip (4 lots)	40,000 (10,000 x 4)	100	48	41	--
	dip	10,000	85	83	73	--
	dip	10,000	0	63	58	--
1985	dip (4 lots)	60,798 (15,000 x 4)	80	61	50	23
	recirculation	53,040	87	73	62	38

Appendix B. Summary of sterile hybrid experiments, 1985.

Two heat-shock regimes were tested (27^{0}C for 25 min. at 25 min. postfertilization) to compare triploidy success and egg survival using a modified "dip" method vs. a recirculating system. Control (normal) and experimental subgroups were established by pooling and fertilizing all eggs, followed by division into two volumetrically equal groups (Appendix A); one to be treated and one to be incubated as usual. The "dip" method utilized a 20-gallon tub heated with a propane stove into which a tray of eggs (+ 10,000) was immersed, whereas the recirculation system consisted of a constant temperature bath from which heated water was pumped (5 gal./min.) over the incubator trays and allowed to percolate through the eggs (+ 50,000).

				• % Survival to			
Date	Method	Group	Subgroups	eye	hatch	fingerling	% Triploidy
3/11	dip	Kamloops	normal	88	84	79	-0-
			heat	61	50	21	80
4/1	recirculation	McConaughy	normal	86	81	75	-0-
			heat	73	62	37	87
4/15	recirculation	redband	normal	78	25	21	-0-
			heat	3	1		

* % survival to hatch is an estimate based on back-calculation from mortality and ponding data.

Appendix C. Cutthroat production summary, 1984-1985.

Year	Lot	Interval	Location	Temp (avg.F)	TU/in.	D	F	C	G*
1984	4-U-ID-19	May 1-July 31	vats	44	67 (est)	0.30	2.57	2.27	.006
	-01		pond	48 (est)	53 (est)	.10	0.53	0.20	.010
	-19	Aug 1-Aug 31**	vats	44	21	0.35	1.40	1.00	.020
	-01		pond	50 (est)	30	0.01	1.17	0.07	.020
	-19	Sept 1- Sept 30	vats	44	86	0.21	1.38	2.43	.005
	-01		pond	47 (est)	63	0.01	1.50	0.67	.008
1985	5-U-ID-15	June 12-June 30	Vat 11	44	34	0.95	2.78	0.46	.012
	-21		Vat 12	44	27	1.00	2.85	0.32	.015
	-33	July 1-July 31	vats	44	(empty until 7/27)				
	-1521	***	pond	47	29	.003	0.34	2.00	.014
	-33	Aug 1-Aug 31	vats	44	33	0.81	2.85	1.53	.012
	-1521		pond	49	39	0.02	0.32	1.18	.015
	-33	Sept 1-Sept 30	vats	44	64	0.64	1.97	1.60	.006
	-1521		pond	47	78	0.03	0.58	1.68	.011

* Growth rate, in./day.
** Growth rates for this interval may be in error (high) due to inaccurate (low) estimate of fry size in prior interval.
*** Lots 15 and 21 pooled.

D = density index
F = Flow index
C = conversion

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